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BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR SEPTEMBER 1938

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FRUIT INSECT INVESTIGATIONS

Lead and arsenic residues on southern-grown peaches not excessive.---Oliver I. Snapp, of the Fort Valley, Ga., laboratory, reports that the results of analyses made by the Division of Insecticide Investigations show that, even when the fruit was not brushed, the residues on harvested peaches that had received lead arsenate in 1938 according to the regular schedule used in the South did not exceed the tolerances, there being 0.0086 grain of arsenic trioxide per pound and a lead equivalent of 0.018 grain per pound on the unbrushed fruit. When brushed before shipment, by means of machines with which most packing sheds are now equipped, the residue load was reduced considerably, there being only 0.0019 grain of arsenic trioxide per pound and a lead equivalent of only 0.0040 grain per pound on the brushed fruit. Although the total precipitation during the season was normal, heavy rains that followed shortly after the completion of the applications at shuck-off and 4 weeks before harvest had been expected to reduce the residue load on the ripe peaches. The results of the chemical analyses show that the arsenic and lead residues were surprisingly lower than anticipated.

Oviposition by first-generation plum curculio in peaches in the South.--Mr. Snapp and J. R. Thomson, Jr., have reported on the study conducted this year at the Fort Valley laboratory to determine the percentage of first-generation plum curculio females that deposited second-generation eggs during the year of their emergence. The first eggs of the second-generation were recorded on June 15, oviposition having started this year 14 days after emergence from the soil, the shortest period between emergence and oviposition of which we have a record. By the end of the peach harvest 37 percent of the new beetles had deposited second-generation eggs; 71 percent had deposited second-generation eggs by August 12; and the last second-generation egg was deposited this year on August 8. In 1937 the last was deposited on August 6 and in 1936 on August 3. Dissections on August 12 of the first-generation females that had not deposited any eggs during the season revealed mature and immature eggs in about 1 beetle out of 10. The rest of them contained no indication of immature eggs or egg formation.

Abundance and flight habits of dried fruit beetle.---Catches of *Carpophilus hemipterus* (L.) in a rotary net operated from April 14 to August 31 in a raisin-storage yard by Dwight F. Barnes and George H. Kaloostian of the Fresno, Calif., laboratory, were as follows: April, 9,400; May, 54,700; June, 56,000; July, 20,600; August, 6,400. Collections removed from the net at intervals of 15 minutes, both all day and all night, showed that the insect is a daytime flier. In July flight began soon after dawn, was most active during bright light, and ended with darkness. Moderate numbers were taken on July 21 while the temperature of the air in the shade was 108°F.

Strawberry leaf roller a reservoir of oriental fruit moth parasite.--H. W. Allen, of the Moorestown, N. J., laboratory, reports that during the last year considerable new information has been gained on Ancylis comptana Froehl. as a reservoir of the dominant oriental fruit moth parasite Macrocentrus ancylivorus Roh. It has been found that this parasite occurs in the strawberry leaf roller in nearly all strawberry-growing sections from Moorestown, N. J., throughout the Eastern Shore to Norfolk, Va. However, its abundance varies greatly in different sections. In order to obtain more definite information on the possibilities of different sections as sources of this valuable species, surveys have recently been placed on a quantitative basis. The following comments refer to the third, or overwintering, brood. In the vicinity of Moorestown strawberry acreage is still much below the average for the last few years. The percentage of M. ancylivorus in strawberry leaf roller is 17.5, which is higher than in any other section surveyed, but, as the overwintering strawberry leaf roller averages about 11,200 per acre, the overwintering M. ancylivorus is only about 1,960 per acre. At Hammonton, N. J., the parasitization is 4.7 percent, the per-acre moth population 14,200, and the per-acre M. ancylivorus hibernating about 680. At Cedarville, N. J., the overwintering strawberry leaf roller is about 22,500 per acre, but the M. ancylivorus parasitization only 0.5 percent, and the hibernating M. ancylivorus about 112 per acre. At Bridgeville, Del., there is a heavier leaf roller population than in any other district surveyed.--56,200 per acre,--and 5.9 percent parasitization, giving about 3,320 M. ancylivorus per acre. This high rate per acre and the extensive cultivation of strawberry in that section probably give this area a much higher total overwintering M. ancylivorus population than any other surveyed. Except for the Bridgeville section, the strawberry leaf roller infestation in the Eastern Shore section of Delaware, Maryland, and Virginia seems unusually low and the numbers of M. ancylivorus overwintering in this host relatively few.

MEXICAN FRUITFLY

Trapping results in the lower Rio Grande Valley.--The 1938-39 season for harvesting of Texas citrus fruits opened on September 15. Traps have been operated continuously from Brownsville to Laredo throughout the month. During this period only one adult Anastrepha ludens Loew was trapped. This specimen came from the city of Laredo. The trap catch in September was the lowest on record. Only 30 fruitflies of various species were taken. In addition to the one A. ludens previously mentioned, five A. serpentina Wied., one unidentified Anastrepha species, and twenty-three A. pallens Coq. were trapped. The following table shows the result of trapping and fruit collection in Texas and Mexico in September:

Species	Texas	Mexico
Adults		
A. ludens	1	0
A. serpentina	5	0
A. sp. not ludens	1	0
A. pallens	23	5
Total	30	5
Larvae		
A. ludens	0	*4

* From Matamoros, Mexico market fruit.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Egg predators inhibit grasshopper abundance in California.--C. C. Wilson, Sacramento, Calif., reports that in 1936, 1937, and 1938, intensive egg surveys have been conducted on 5,760 acres of natural habitat of the clear-winged grasshopper (Camnula pellucida Scudd.) in San Luis Obispo County. Square-foot samples of soil were taken on approximately 380 acres representing 43 major egg beds of the area. In the course of the surveys each egg pod was examined for predators--larvae of bee fly (Aphoebantus hirsutus Coq.) and blister beetle (Epicauta puncticollis Mann.). The potential grasshopper population in 1936, 1937, and 1938 has been reduced by these predators 29 percent, 60 percent, and 28 percent, respectively. Although there was a reduction in total egg pods per square foot in 1938 over 1937, there was an increase of 0.6 egg pod uninjured by predators per square foot. This increase, however, is attributed to the persistent scarcity of predators on those egg beds where the percentage attacked ranged from 0 to 20. If these egg beds were eliminated from the 3 years' data the good egg pods per square foot would be 6.8, 3.8, and 2.8, respectively. Furthermore, if the egg beds having from 0 to 20 percent of the pods attacked were grouped for this period, the average good egg pods per square foot would be 1.8, 0.9, and 2.6, respectively, and would account for the 1938 increase in good egg pods. These data are summarized in the following table.

Year	Egg pods	Predators: Bee fly	Predators: Blister beetle	Predators: Total	Reduction by predators	Average egg pods per square foot: Total	Average egg pods per square foot: Good
	Number	Number	Number	Number	Percent	Number	Number
1936	2,223	180	469	648	29	5.0	3.5
1937	1,096	122	535	657	60	2.8	1.1
1938	1,073	28	274	302	28	2.4	1.7

Damage by corn ear worm in Illinois.--R. A. Blanchard, Urbana, Ill., reports that the corn ear worm, notwithstanding its early appearance, was less abundant in Illinois, in general, than it was in 1937. Examinations showed, however, that late corn in southern and south-central Illinois was very heavily infested, with considerable damage resulting. In some fields larvae were actively feeding in considerable numbers on October 1. Damage in those fields will increase until the larvae are killed by frost. The warm dry weather in the latter half of September caused rapid drying of the corn, thereby limiting the extent of the damage to early planted corn.

Winter mortality studies of grasshopper eggs.--E. G. Davis, Bozeman, Mont., reports that the percentage of winter mortality of eggs on the intensive study areas in North Dakota, South Dakota, Minnesota, and Montana, showed considerable variation among the areas during the winter of 1937-38. The total percentage of mortality ranged from 10.0 on the Havre, Mont., area to 61.4 on the Dickinson, N. Dak., area. The average mortality of six areas in these four States was 32.4. The predators chiefly involved in the destruction of the pods were larvae of bee flies, blister beetles, and carabids. Occasionally a wireworm larva was found destroying a pod. Many pods were also found which had failed to hatch but had apparently not been attacked by predators or parasites.

Length of exposure a factor in fumigation for flour beetle.--R. T. Cotton, Manhattan, Kans., reports that experimental work on the fumigation of bagged flour indicates that, although a dosage of 16 ounces of liquid hydrocyanic acid per ton of flour fails to give an immediate kill of flour beetles with an overnight exposure, the flour absorbs and retains enough gas so that all insects are killed if they are left in the flour for 24 hours after it is removed from the vault, and if the dosage is reduced to 12 ounces per ton a perfect kill will be obtained if the insects are left in the flour for 48 hours after its removal from the vault. Analysis of the fumigated flour indicates that the gas becomes distributed throughout the stack with reasonable uniformity by the end of the exposure period. Experiments with rolled oats showed that very similar dosages were required to effect a perfect kill, although the oats absorbed and retained more of the fumigant than did the flour.

Seasonal abundance of corn ear worm in northern Virginia.--F. F. Dicke, Arlington Farm, Va., reports that the survey conducted in Fairfax County to determine the seasonal abundance of the corn ear worm shows that the population is approximately the same as the above-normal population for 1937. Sixty-four percent of all the ears examined were found to be infested, as compared to 54.8 percent in 1937. The normal average infestation is considered to be between 30 and 35 percent. The increase in the percentage of ears infested over that of 1937 is attributed to a decrease in the corn acreage in this area. This decrease is estimated to be about 20 percent. The total acreage in the area surveyed having all ears infested was slightly lower than in 1937. The following table summarizes the results of this survey in Fairfax County.

Date silking began in 1938	Fields	Acres of corn silking		Ears infested	Range of infestation in fields	Acres 100-percent infested	
	Number	Number	Percent	Percent	Percent	Number	Percent
July 13-20------	7	51	17.5	31.7	40.0-67.0	26.4	14.0
July 20-27------	17	138	47.3	54.4	21.0-87.0	75.1	39.8
July 27-August 3	6	69	23.6	78.7	56.0-93.0	54.3	28.8
August 3-10-----	4	27	9.2	95.5	89.0-99.0	25.8	13.8
August 10-17----	1	7	2.4	100.0	--	7.0	3.7
Total-------	35	292	100.0	64.0	--	188.6	64.6

The high population level of the ear worm in 1937 and 1938 is primarily due to mild winters. The population in 1937 was approximately double that of 1936, which was preceded by a severe winter. It is believed that the population in 1938 was kept stable primarily because of a high mortality of hibernating pupae during the previous fall and winter. The mortality is largely attributed to the high soil moisture prevalent from October to March. The maximum acreage of corn came into silk between July 20 and July 27, and when this acreage reached its maximum fresh-silk stage the number of eggs per silk was at a minimum; however, the peak in the seasonal abundance occurred in this peak acreage. As in the past 4 years, the data on seasonal abundance show that the percentage of ears infested is a poor figure to use for a comparison of the abundance during the season. The abundance of the attractive host material present in the field (early blossoming stage of corn) at any particular time is the major item to be considered in determining seasonal abundance of this insect.

A new preferred host plant for potato leafhopper.--"In all of our past work on Empoasca fabae (Harr.)," reports F. W. Poos, of the Arlington Farm, Va., laboratory, "it appeared that this species preferred potato when given its choice for oviposition. However, recent observations indicated that the broad bean (Vicia faba) was severely injured by this insect under all conditions. Five tests were therefore made during the period May-July, 1938 to determine whether this leafhopper preferred broad bean or potato for oviposition. Ten plants of each species were used in these tests and a total of 1,566 nymphs were counted, 72.7 percent of which hatched from the broad bean plants, or nearly three times as many as hatched from the potato. Remarkable control of the potato leafhopper injury on alfalfa by a mixture of pyrethrum and sulphur dust applied to the crop after the injury had become apparent was obtained in preliminary tests at Arlington Farm and at Oakton, Va., in 1938."

JAPANESE BEETLE CONTROL

Aerial maps facilitate scouting for Dutch elm disease.--Aerial photographic maps showing the terrain over which Dutch elm disease scouts are operating, with landmarks and the actual trees examined or sampled, have increased the efficiency of the seasonal surveys for infected trees. On each map have been drawn in township and county lines, and a system of grid lines showing the degrees and minutes of latitude and longitude. New Jersey maps are 6-minute quadrangles, covering 35 square miles, while maps of New York and Connecticut are 5-minute quadrangles covering 27.8 square miles. In all except one county the scale is 1 inch to 3,000 feet. In the infected area, foremen are furnished with key maps covering 5 or 6 quadrangles assigned to individual scout crews. On the quadrangles in the hands of the crews are plotted all naturally elm-free areas, areas in which elms have been silvicided, and sections that have been clear-cut to remove all elms. Aerial maps are in use by foot scouts working throughout the Connecticut work area, in Rockland, Dutchess, Suffolk, and Nassau Counties, N.Y., in all New Jersey counties except Monmouth County and the metropolitan area, and in the Pennsylvania work area adjacent to the Delaware River. One of the principal advantages of the aerial maps is that it is no longer necessary to assign one man in a crew to make measurements to nearby landmarks in writing up the location of a sampled tree. By placing a dot on the exact tree involved and surrounding this with a circle, it is possible accurately to estimate distances from nearby landmarks by the grid lines of the map at intervals of 4,000 feet. Eradication crews in turn are furnished with maps on which elms to be removed are spotted. This permits return to the exact spot by the nearest accessible road, thereby speeding up the work.

Autogiro scouting for Dutch elm disease.--All five autogiro ground crews in Connecticut were unable to work during the week of September 18 to 24, inclusive, owing to the hurricane. On Tuesday, September 27, one autogiro scouted Ross Township in Monroe County, Pa. Ground crews will scout the roads in this particular township. The flying unit in New Jersey completed the second go-over on September 26. Approximately 44.56 square miles were scouted. Ground crews completed Ringwood and West Milford Townships in Passaic County and Vernon and Walpack Townships in Sussex County during the last week of the month. Approximately 121.65 square miles were scouted on this second go-over. In New York, the two flying units scouting in Putnam County completed the second go-over on September 28. This completed all the flying assignments in the State of New York.

Approximately 129.7 square miles were scouted. Ground crews following up in Putnam County should complete this work early in the first week in October, concluding all autogiro scouting operations in New York. The flying unit assigned to autogiro railroad scouting, completed scouting 4,706.2 miles of railroad rights-of-way on the northern loop of railroads on September 24, 1938. Ground crews should complete the assignment on the northern loop in the first week of October.

Sampling of each elm necessary to determine late-season infection.--A confirmation in Putnam Valley Township, Putnam County, N. Y., consists of an elm tree with double trunk, each trunk measuring 18 inches DBH. This tree was discovered by one of the New York State auto-cruising crews. Without doubt it was a 1938 infection, as there was no dead wood in it. This confirmation is approximately 1 mile west of the 1938 Carmel Township tree and less than 1 mile north of two 1938 confirmations. Two trees in Glen Cove, Oyster Bay Township, Nassau County, N. Y., were confirmed on September 15. Both of these trees had yellow and thinning leaves, but so did the other elms in that vicinity, and they probably would have been missed if all the trees had not been climbed. On September 16 a tree in Lottingtown in the same township was confirmed. This particular tree seemed healthy when another tree near it had been confirmed. When the first of these two trees was being eradicated on September 2, no symptoms were noted in the other tree. On September 3 the scouts hauled some beetle wood to the fire where the first tree was being burned. They noticed then some yellow leaves on one side of the tree. They sampled the tree and observed a few streaks in the sample. In little more than a week this tree was almost bare of leaves. Its death was one of the most rapid ever observed.

Hurricane makes extra work for Dutch elm disease crews.--During the week ended September 24, heavy rains were constant through Monday, Tuesday, and Wednesday, reaching torrential proportions at times, and culminating on Wednesday in a hurricane that swept New Jersey, New York, and the New England States. Thousands of trees were blown down and many homes demolished. From Long Island through Connecticut, Rhode Island, and Massachusetts many lives were lost in the worst storm in several generations. During the latter part of September all Connecticut sanitation crews equipped with trucks that could be used for hauling worked on elms felled and uprooted by the hurricane of September 21. With good weather during the last week of September, the eradication crews in New Jersey were able to lower the number of standing Dutch elm diseased trees.

First-record Dutch elm disease infection.--During the last week of September a confirmation was received for a tree in West Easton, Northampton County, Pa. Extension of the infected zone to include this new infection required the addition of Greenwich, Harmony, Lopatcong, and Pohatcong Townships, the borough of Alpha, and the town of Phillipsburg, all in Warren County, N. J., an area of 49.55 square miles. The extension necessary in Pennsylvania is approximately 5 square miles.

Valuable elm succumbs.--A Dutch elm disease confirmation early in September was an elm 44 inches DBH at Greenwich, Fairfield County, Conn. This tree was in front of an old stone house which the owner had purchased in Europe, taken down, and rebuilt in this country. The particular site for the house was selected because of this elm and its removal spoils the effect of age so necessary in a proper setting for the house.

Season's scouting concluded.--Systematic scouting for Dutch elm disease was officially ended on Friday, September 30, and the personnel was rearranged for the October set-up. All tools and equipment were checked and preparations completed for tagging dead and dying trees and for sanitation work to start on October 3.

Data on fumigation for Japanese beetle.--During the period of the farm-products quarantine the total number of cars fumigated with hydrocyanic acid was 6,256. Of this number 5,478 cars were empties, 633 contained bananas, 59 contained onions, 81 contained potatoes, 3 contained tomatoes, 1 car was a mixed load, and 1 contained sweetpotatoes. The fumigation of farm products with methyl bromide cased early in September, the last cars being fumigated at the Edge Moor railroad yards in Delaware on September 10. Forty-three cars of sweetpotatoes were fumigated at the Edge Moor yards and one car at the Greenwich yard in Philadelphia, Pa. During the season 2,613 cars of potatoes, 61 cars of sweetpotatoes, 51 cars of onions, 8 cars of tomatoes, and 2 mixed loads were fumigated with methyl bromide, making a total of 2,735. The total number of cars fumigated, including both hydrocyanic acid and methyl bromide treatments, was 8,991.

Japanese beetle control activities on the Eastern Shore of Maryland.--During September shipments of sweetpotatoes from the Eastern Shore of Maryland were very numerous. Approximately 120 refrigerator cars of sweetpotatoes were inspected and certified for shipment outside the Japanese beetle regulated area. Several thousand units of this same commodity were also inspected, with the possibility that they might be consigned to points outside the quarantined area. Between September 1 and September 20, the date of lifting the farm products quarantine, 30 cars of apples were certified for shipment outside the regulated area from Maryland's Eastern Shore. Also in the same district 43,000 strawberry plants were inspected and certified for shipment during September.

Gain in nursery shipments from central Pennsylvania.--There seems to be a definite gain in the fall nursery business in the New Cumberland, Pa., district. Larger orders are now being handled than in any of the past several years. Several carload shipments of nursery stock, originating at a nursery in Lancaster County, were made to the western part of the State, and actual inspections of material being moved outside the Japanese beetle regulated areahave shown a definite increase.

Transfer of Japanese beetle district supervisors.--On September 1 H. L. Smith was transferred from the supervision in the New York City district office to the supervisorship of the Dover, Del., district. H. B. Ward was transferred from supervision of the Richmond, Va., district field office to supervision of the district office at Syracuse, N. Y., on September 16. Leland Wolfe, formerly distri supervisor at Syracuse, N. Y., assumed supervision of the New York City district office on October 1.

Japanese beetle fumigation and farm-products restrictions lifted.--Effective at midnight August 31, fumigation of empty refrigerator cars used to haul fruits and vegetables was discontinued. Screening of vents was required until September 10. When farm products were loaded in uninspected cars, the loaded car was fumigated before certification. Restrictions on the movement of farm products were lifted on September 20 until June 15, 1939.

Late Japanese beetle infestation.--On September 23, ten live Japanese beetles were found feeding on grape foliage in Elmira, N. Y. These beetles were found by an inspector in the course of special checking to determine how late beetles might be found in that section.

Harrisburg rose gardens delayed blooms.--Rose gardens in Italian Park at Harrisburg, Pa., were in good bloom in late September, attracting many visitors. During the time of the Japanese beetle flight the beds were sprayed and kept more or less free of blooms, so that they are now in beautiful condition.

Trapping for Japanese beetles at Springfield, Mass.--Information was received from the Park Department of Springfield, Mass., as of September 15, that 600,000 Japanese beetles were caught in the 1,650 traps in operation in that city during the summer.

Infested material shipped from reservoir site.--Portions of several adjoining townships in central Massachusetts have been taken over by the State for a link in the chain of reservoirs that make up the Boston metropolitan water supply. In the region several villages and many old homes have been abandoned and practically all the lumber has been cut. In some instances extremely old and highly valued homes are being torn down and the material transported to other sections for rebuilding. Up to the present time, 19 gypsy moth egg clusters have been found and removed from material taken from these old houses before it was transported outside the gypsy moth regulated area.

Increase in gypsy moth personnel.--Owing to the increase in fall shipments of nursery stock to points outside the gypsy moth regulated area, two inspectors were employed temporarily in nurseries, one at Fryeburg, Maine, and the other at Newport, R. I. It became necessary also, to station two inspectors at a nursery in western Massachusetts to inspect material prior to storing it for early spring shipment.

FOREST INSECT INVESTIGATIONS

Elm bark beetle may breed in small branches.--Galleries of the smaller European elm bark beetle (Scolytus multistriatus Marsham) are sometimes found in dead or dying elm branches measuring an inch or less in diameter. C. H. Hoffmann, of the Morristown, N. J., laboratory, reports that adults have emerged from small, infested elm sticks that he collected this year, the smallest of these being 1 inch in diameter.

Diseased sapwood may contaminate elm bark beetles.--It has been noted that adults of the smaller European elm bark beetle sometimes pentrate the bark of elms affected by the Dutch elm disease but, on finding conditions unsatisfactory for making galleries, leave the trees and go elsewhere. An experiment conducted by W. D. Buchanan, of the Morristown laboratory, indicates how beetles may thus become contaminated with Ceratostomella ulmi. Adults of S. multistriatus and of the native elm bark beetle (Hylurgopinus rufipes Eich.), known to be free of the fungus, were allowed to attack logs immediately after they had been cut from a diseased tree. The discoloration that occurs in trees affected by the disease was evident in these logs in the wood of the current season's growth. As soon as the beetles had reached the sapwood they were removed and later cultured by the Bureau of Plant Industry. The fungus was obtained from 4 of 54 S. multistriatus adults and from 11 of 69 H. rufipes adults. Fifty of the areas where S. multistriatus adults had come in contact with the sapwood were also cultured. The fungus was obtained from 11 of these areas.

Beech scale shows little increase in Maine.--R. C. Brown and L. D. Casey, of the New Haven, Conn., laboratory, report that 37 permanent sample plots established in 1933 in central and eastern Maine were examined during the last 2 weeks in September, in cooperation with representatives of the Division of Forest Pathology, Bureau of Plant Industry. The intensity of the scale infestation is not appreciably heavier than in 1937 nor is there any marked increase in the number of dead trees.

Investigations on the European spruce sawfly.--P. B. Dowden, New Haven, reports that the survey on the European spruce sawfly was completed in New Hampshire, Vermont, and New York on September 24. This work was done in cooperation with State agencies in New Hampshire and Vermont, whereas in New York all of the survey was conducted by State employees. Microplectron rearing was brought to a close on August 20. Between 5 and 6 million parasites were reared. About 1-1/2 million were liberated in New York, 1-1/2 million in Vermont, 1 million in New Hampshire, and 1 million in Maine. Small numbers of several species of spruce sawfly parasites were received from the Canadian parasite laboratory during August and September. About half of the material received was liberated, while the other half was held at the laboratory for experimental rearing. Two species of cocoon parasites have been studied and one of them has been bred in considerable numbers for one generation. Five species of larval parasites have also been studied. Only one species (Holocremnus) was observed mating, but all five species have deposited quite a few eggs on larvae of Diprion polytomum (Htg.). On August 19 a 3/4-acre plot heavily infested with spruce sawfly was sprayed at Wilmington, Vt., by personnel from the Division of Gypsy Moth and Brown-tail Moth Control. This plot will be sprayed each year and the trees compared with adjoining trees, which will not be sprayed.

Foliage injury.--Wetting, spreading, and emulsifying agents were prepared which were nontoxic to tender foliage when applied in concentrations generally used in ordinary and concentrated spray mixtures. Most oil sprays have not been safe on dormant trees at concentrations greater than 2 to 4 percent, nor on summer foliage at concentrations greater than 1 percent. Often these concentrations are too weak to control the insect. Both the oil and the emulsifying agent have caused injury. Recent developments, however, indicate that certain oils can be used up to 15 percent on tender foliage without causing injury. In concentrated lead arsentate spray mixtures, and to a considerable degree in ordinary spray concentrations as well, the addition of small quantities of ferrous sulphate and lime practically eliminated the injury to wild black cherry, which has practically the same degree of resistance to injury as peach, plum, cherry, and beans. The ferrous sulphate-lime mixture greatly increased the adherence of the lead arsenate. In ordinary spray concentrations of calcium arsenate the addition of weak solutions of bordeaux mixture greatly reduced foliage injury. In concentrated sprays the addition of lime to reduce free arsenic and the addition of "casco" casein glue and corn oil to coat the particles greatly reduced injury.

Dust adhesives and carriers.--Twelve dust mixtures were applied to spruce and to deciduous growth. The insecticides used were lead arsenate and calcium arsenate, with which barite and celite were used as carriers. The adhesives and spreaders were dehydrated molasses and milk solids, glycerine, corn oil, soybean flour, triethylamine oleate, and "casco" casein glue. Glycerine has served very well to take up moisture from the air and some of the adhesives appear to be very good. A given volume of barite weighs 4 times as much as the same volume of lead arsenate and 16 times as much as celite, and therefore reduced the amount of drift by wind.

Western yellow pine susceptible to attack by eastern species of Matsucoccus.--T. J. Parr, of the New Haven laboratory, reports on investigations with the eastern species of *Matsucoccus*: "*Matsucoccus* eggs planted on the twigs of western yellow pines at Rainbow in May hatched and some of the crawlers became established. The number able to maintain themselves was small, however, in comparison to the number of eggs planted. Those that did live have gone through the last molt and have migrated to the bark of the large branches and main trunks, where they are laying eggs. An hemipterous predator, *Orius insidiosus* Say, has been observed feeding on *Matsucoccus* egg masses on pitch pine."

Oviposition habits of the locust borer.--H. C. Secrest, Milwaukee, Wis., has found that there is a distinct relation between air temperature and the usual daily migration of the beetles from goldenrod to the trees. On one cool, cloudy day, when the temperature remained below 70° F., the beetles did not leave the goldenrod blossoms. This was also the case on cold rainy days.

Forest-insect-survey program.--Forest-insect surveys being conducted by the forest-insect laboratory at Coeur d'Alene, Idaho, include a resurvey of the Coeur d'Alene National Forest, the Clearwater National Forest and adjacent private land, the Kootenai National Forest, the Yellowstone National Park, and the Grand Teton National Park, with rechecks of potentially dangerous areas disclosed by 1937 surveys within the St. Joe, Kaniksu, Weiser, and Nezperce National Forests. This program, which is under the direction of T. T. Terrell, includes 2,642,500 acres, exclusive of the areas to be rechecked. Two crews of four and eight men are being used in the execution of these surveys. The smaller crew is employed on the Yellowstone and Grand Teton National Park projects, the larger on the National Forests of northern Idaho. The Coeur d'Alene and Grand Teton Park projects have been completed, with the Clearwater to be completed in a few days. The remainder of the program will be completed during the latter part of October.

Douglas fir shortage.--According to J. M. Whiteside, of the Portland, Oreg., laboratory, there is a decided shortage of Douglas fir on the Colville National Forest, in northeastern Washington, from which to cut railroad ties. Depredations by defoliating insects and the Douglas fir bark beetle (*Dendroctonus pseudotsugae* Hopk.) over a period of approximately 20 years have so reduced the estimated stands of this species that forest officers are having a difficult time finding quantities sufficient to warrant tie sales. On many areas the only live firs to be found are those of small diameters, usually below 14 or 16 inches, the larger trees remaining as snags in varying stages of deterioration.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Hurricane and floods damage tree growth and property.--Only limited reports of conditions in the gypsy moth area affected by the flood and hurricane are now available, but it seems evident that the barrier-zone sections of Vermont, Massachusetts, and Connecticut were on the western edge of the hurricane area and suffered less damage than the sections east of the zone. The gypsy moth infested areas in Pennsylvania and New York were not affected by the hurricane and flood damage was small. Future gypsy moth scouting and treatment work in the affected sections will be greatly impeded by fallen trees and debris on the ground, and the shattered tree trunks and branches will render efficient scouting work more difficult by providing countless new sites for the deposition of egg clusters. Incomplete reports from the field indicate that no injury was sustained by any gypsy moth employee and that the only government property to sustain appreciable damage was the autogiro owned by this activity. This machine was stored in a hangar at the Orange, Mass., airport, which was directly in the path of the hurricane. The wind lifted the roof and sides of the hangar, throwing them backwards mostly away from the autogiro, but demolishing the rotor blades and slightly damaging one wing and the rudder.

Sprouts grow rapidly in selectively thinned areas.--Sprouts have grown very rapidly during the past summer in all sections of New England where gypsy moth thinning work was done last winter and spring, particularly in Massachusetts and Connecticut. Exceedingly wet and humid weather prevalent from the middle of July until late in August was conducive to the rank growth of the sprouts, many of which exceed 6 feet in height. Selective thinning of the sprouts has already been started in certain localities and this type of work will increase as the season develops and conditions become more suitable for treatment work.

Dense thickets of mountain laurel thinned to facilitate scouting.--Many of the gypsy moth infestations found within the barrier zone in southwestern Massachusetts and in northwestern Connecticut are located in areas where mountain laurel is very abundant. The laurel grows in dense thickets of intertwined branches, which are very difficult to penetrate. In certain localities it has been necessary to remove some of the plants so that those remaining could be examined efficiently.

Old infestation apparently eradicated.--Burlap bands attached to trees last spring at the site of a gypsy moth infestation discovered during the fiscal year 1936 in Derby, Vt., were removed and destroyed in September. The trees in the vicinity of the old colony site were carefully scouted and, as no evidence of the presence of the gypsy moth was found, the infestation is considered to be eradicated.

No gypsy moths found in Somerset, Vt.--Gypsy moth scouting of the open areas in Somerset, a township adjacent to the barrier zone in southern Vermont, has been completed. No evidence of the gypsy moth was found.

Gypsy moth discovered in two previously uninfested towns.--About the middle of September a single-egg-cluster infestation was found in the town of Goshen and another single-egg-cluster colony was discovered in the town of Granville, Addison County, Vt. These towns are situated on high elevations in the Green

Mountain Range, within the borders of the barrier zone, and have not previously been infested. It is evident that these infestations became established as a result of the wind spread of small gypsy moth caterpillars from infestations existing along the White River to the east of, and outside of, the barrier zone. The woodland growth in the immediate vicinity of both infested sites consists chiefly of maple, yellow birch, and beech.

Fall nursery digging delayed in New York State.--Nurserymen in the gypsy moth quarantined area on Long Island, N. Y., delayed their fall digging during the first part of September. The unusually dry and baked condition of the soil in the nurseries made the digging of a satisfactory ball of soil around the roots of shrubs extremely difficult.

Scouting work begun at sites where gypsy moths were attracted to assembling cages.--Scouting work was started during September in the vicinity of assembling cages where male gypsy moths were taken during the past summer in Pennsylvania. One gypsy moth infestation has been located approximately 650 feet from a cage where a moth was found in Kidder Township. No infestation has yet been discovered at the sites of cages that attracted moths in Tobyhanna and Dennison Townships.

Gypsy moth scouting on the banks of the Susquehanna and Lackawanna Rivers.--Gypsy moth scouting work was started early in September along the Susquehanna and Lackawanna River banks and the lowlands frequently flooded by these streams in the townships of Hanover, Plymouth, and Wilkes-Barre, Pa. Progress has been slow, as this work is necessarily very intensive. Recently constructed dikes, or levees, built along the banks of the Susquehanna River for flood-control purposes have materially reduced the quantity of tree growth and debris to be examined. During the course of construction the river banks were thoroughly cleaned and all brush, tree growth, and driftwood were destroyed by burning in many sections.

Summary of C. C. C. burlapping work.--A total of 613,014 trees were burlapped by C. C. C. gypsy moth enrollees during the past season in 32 towns in Massachusetts, Connecticut, and Vermont. More than 7,684,400 gypsy moths in the caterpillar or pupal stages were crushed by the men who patrolled the bands; approximately 6,400,000 in Massachusetts, 1,170,000 in Vermont, and 65,000 in Connecticut. The amount of this type of work done last season was only about half that of the previous year, because of the great reduction in the number of C. C. C. camps in the areas where gypsy moth work is performed.

All types of gypsy moth work to be used at a heavy infestation in Connecticut.--A great deal of intensive work is planned for the coming year at the heaviest and most extensive gypsy moth infestation that has ever existed west of the Connecticut River. The infestation covers more than 1,000 acres in the towns of Granby and Simsbury, in the northwestern section of Connecticut, and a careful count made in one part of the colony showed approximately 60,000 egg clusters to the acre. All types of gypsy moth work will be done in this area, in order to prevent the westward spread of small caterpillars next spring. The work has been speeded up by discontinuing the creosoting of egg clusters on the forest debris, and the waste material is gathered into piles and burned. The egg clusters on the trees, within reach from the ground, are being creosoted as rapidly as possible, and this work will continue through the winter. Many of the trees will have to be climbed, later, in order to destroy large numbers of egg clusters on the upper

COTTON INSECT INVESTIGATIONS

Airplane dusting for hemipterous insects.--T. P. Cassidy reports that one company near Tucson, Ariz., dusted all of their cotton crop, consisting of 3,000 acres of short-staple and 300 acres of Pima cotton, this season by airplane for control of hemipterous insects. The Bureau cooperated in making population counts and recommendations for poisoning. The infestation of hemipterous insects was very light, as compared with the populations in the Yuma and Salt River Valleys, and consisted principally of *Lygus* spp. Three applications of 7½-percent paris green and 92½-percent sulphur mixture at the rate of 15 pounds per acre-application at 7-day intervals were used. The airplane operators applied the poison for 45 cents per acre-application.

Hemipterous cotton insects in 1938.--Studies to obtain additional information on the seasonal distribution and migrations of hemipterous insects from other host plants to cotton were continued by Horace G. Johnston, of the Tucson laboratory, from June 15 to August 2. Special attention was given to the Yuma Valley of Arizona, where larger populations and more severe damage occur than in any other important cotton growing area of the Southwest, though collections and observations were made in the Bard and Blythe areas in California, the Deming area in New Mexico, the Presidio area in Texas, and by other members of the Tucson staff in other sections of Arizona. Forty-five species of hemipterous insects were collected on cotton. Four of these had not been previously recorded, though many are merely of accidental occurrence and of no economic importance. Of the six species feeding on bolls, *Euschistus impictiventris* Stal and *Chlorochro sayi* Stal were again by far the most important. Of the six species feeding on squares, *Lygus hesperus* Knight is the most abundant and important, although *Creontiades femoralis* Van D. was sufficiently abundant in the Salt River and Yuma Valleys to be an important factor. Of the predators, *Geocoris sonoraensis* Van D. was the most abundant, although little information has been obtained on the importance of the predators. *Euschistus impictiventris* was more abundant and decidedly more uniform and generally distributed on cotton in the Yuma Valley than in 1937. When observations were first made in alfalfa-seed fields about June 15, most fields were in full bloom and *E. impictiventris* was quite abundant. By the following week they had largely disappeared from sight and very few were found for several weeks, or until the alfalfa was cut for seed and raked into windrows. Adults and nymphs then appeared in large numbers, crawling out of the cracks in the ground where they had apparently gone for protection. Many of the adults began to leave the fields immediately but the nymphs and some of the adults remained under the shocks until threshing time and no doubt many of the nymphs found sufficient food to reach maturity after mowing. *C. sayi* was found in the same manner as *E. impictiventris* and why this species was not more abundant in cotton in the Yuma Valley this season cannot be explained at present. *Lygus hesperus* has been classed as a square-feeder, because it feeds readily on squares or in the terminal and lateral buds, principally the laterals, causing destruction of the tiny squares. It now seems that this species may cause considerably more damage by feeding on the small bolls than was formerly attributed to it, and accounts for a considerable percentage of the so-called "natural shed" attributed to unfavorable weather conditions. The heavy migration of *Lygus* to cotton started about July 1, which coincided with the beginning of the excessively hot weather and the time alfalfa seed was rapidly maturing. Many of the larger bolls were punctured but not shed and, although they probably would be punctured later by pentatomids, some of the stained and otherwise injured bolls were undoubtedly due to Lygus feeding. Populations of Lygus nymphs were quite large on alfalfa hay just before cutting, but apparently most of them perished after the hay was cut. Creontiades femoralis leaves alfalfa early and continues to breed in cotton throughout the season, and most of the other species breed sufficiently on cotton to be of importance. However, the alfalfa-seed-field relationship is thought to explain largely the variations in abundance of hemipterous insects on cotton in the different areas of Arizona. The Yuma Valley produces a higher percentage of alfalfa seed than any of the other areas, and consistently has the highest population of hemipterous insects in cotton. In the Buckeye area of the Salt River Valley, alfalfa seed production is much less and the insect population in cotton fields is consistently less than in the Yuma Valley. In the Mesa area of the Salt River Valley, alfalfa seed production has been practically eliminated in recent years, owing apparently to injury by Lygus hesperus and Chlorochroa sayi, and the insect populations on cotton during the last 2 years have been light, despite the large acreages of alfalfa hay. In the Salt River Valley as a whole, however, other cultivated host plants, especially sugar beet seed, have become important factors in the hemipterous insect problem in recent years. In the Tucson area, where no alfalfa seed is grown and the production of alfalfa hay is relatively small, the populations in cotton fields have been consistently low. In the Safford area a small percentage of alfalfa seed is produced but an abundance of alfalfa hay. This area has consistently shown relatively small populations in cotton fields, although somewhat larger than in the Tucson area. There is no doubt, however, that if all the alfalfa acreage in some areas, as the Yuma Valley, were utilized for hay sufficient numbers of insects would still develop to be of economic importance to cotton, unless alfalfa hay production was continued throughout the summer, which is not the usual practice.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Stalk destruction.--The chief activity in the lower Rio Grande Valley of Texas has been the destruction of cotton stalks. The cotton acreage for the past season was 259,535, and stalks had been destroyed on 237,824 acres by the end of September. Approximately three-fourths of the acreage not plowed is in the northwestern part of the district in what is known as the dry-land farming section. The crop was considerably later in this section and growers were granted an extension of time so that they could complete the harvesting of the crop. The same program is being carried out on the Mexican side of the river. The cotton acreage last season was estimated at approximately 150,000, and work had been completed on 85 percent of this acreage by the end of September. The stalk-destruction program is also being carried out in the Coastal Bend area of Texas, which includes the counties of Brooks, Jim Wells, Kleberg, and Nueces. It will be recalled that a light infestation was found in these counties for the first time in the 1938 crop. Rains have interfered with the work, but by the end of the month from 60 to 85 percent of the acreage had been completed. Work is much further advanced than these figures would indicate, as the 85 percent applies to the county containing the largest acreage and the 60 percent to one of the counties containing the smallest.

Field clean-up.--Mention was made in a previous letter that a special control program, consisting of field clean-up, delayed planting, and other practices, would be resumed in the Big Bend area of Texas this season to reduce the heavy infestation and thus lessen the danger of spread of the pink bollworm to other areas.

Cotton growers are behind the program and have made an effort to pick the cotton as rapidly as possible so that fields could be cleaned early. Showers caused the cotton to open rather slowly and there have been two floods which have handicapped picking and field cleaning considerably. The floods, however, have killed a considerable number of cotton plants, especially where the stalks had been cut and stub plants were coming out. Indications are that many worms were also killed, as a limited number of flooded bolls have been inspected and all specimens found were dead. As soon as the fields dry sufficiently there will be a considerable acreage ready for cleaning. By the end of the month stalks had been cut on something over 1,000 acres. The stalks are piled as they are cut and then burned as soon as they dry sufficiently, which usually requires 5 or 6 days.

Vehicular inspection.--The road-inspection station near Falfurrias, Tex., was operated throughout the month with about the same number of cars inspected as during the previous month; however, there was a considerable decrease in the number of confiscations made. At the end of September the station was turned over to the Division of Mexican Fruitfly Control, but during the next few months an inspector will be at the station to represent this Division, as there will be some movement of cotton products from the lower Rio Grande Valley. The road-inspection station at Marfa, Tex., to prevent the movement of products from the Big Bend area, was opened on September 1. Nearly 200 pickers were inspected, with very little contraband material being found. Many pickers leave the Big Bend each fall for other areas, but as the station has been operated for a number of years they are familiar with requirements and see that all their effects are cleaned before leaving home.

Inspection.--It is almost impossible to obtain suitable trash from sea-island cotton for inspection with a machine; consequently, field inspection has been carried on in the sea-island plantings of northern Florida and southern Georgia. Some 87 man-days have been devoted to this activity with negative results. Gin-trash inspection has been carried on over a large area and under excellent conditions throughout September. Inspections were carried on in Alabama, Georgia, Florida, Louisiana, Oklahoma, Texas, and Arizona. A total of 33,769 bushels of trash was inspected in the above States with negative results. All of the inspections were outside regulated areas except in Arizona, where some 2,200 bushels of trash were inspected. This was in the Coolidge-Casa Grande section, where an extremely light infestation was found last season. In the El Paso Valley of Texas a small amount of trash was examined by regulatory inspectors. In 35 bushels of trash inspected, 2,316 specimens of the pink bollworm were found. Most of these specimens originated in the southeastern part of Hudspeth County, which is designated as heavily infested. For the past several years a considerable percentage of the worms found in the heavily infested part of Hudspeth County have been dead. It had been thought that the mortality is probably due to some disease, and a number of efforts have been made to determine this point, but without success. It is of interest to note that this season the percentage of dead worms is much lower than for the last few years.

Thurberia-plant eradication.--The eradication of Thurberia plants in southern Arizona has gone forward satisfactorily throughout September. Work is still being carried on from a camp in the Santa Cataline Mountains. During the month 4,640 acres were covered and 30,774 Thurberia plants were located and destroyed.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

L. B. Reed transferred to Washington.--L. B. Reed, associate entomologist, was transferred on October 1 from the Sanford, Fla., laboratory of this Division to the Washington, D. C. office, to assist in the research work, with particular reference to the statistical phases of experimental plot technique, sampling methods, and analyses of data; also to aid in the review and preparation of manuscripts, reports, programs of work, and miscellaneous experimental data. In connection with this work, it is planned to have Mr. Reed visit the various field laboratories of the Division from time to time for the purpose of consulting the field personnel and to become intimately familiar with the details of each of the work projects as a result of direct observation and contact.

Tomato psyllid injures potatoes.--M. F. Bowen, of the Modesto, Calif., laboratory, made an investigation during the period August 5-27 of the outbreak of Paratrioza cockerelli (Sulc.) on potatoes in western Nebraska, eastern Wyoming, and northeastern Colorado. The results demonstrated that the 1938 outbreak of this pest was the most severe ever experienced in Nebraska. Psyllid yellows, a disease caused by the feeding of the immature forms of P. cockerelli, caused a reduction in the yield of potatoes estimated at approximately 80 percent of the farm value of the early crop and approximately 10 to 15 percent of the value of the late crop in the districts examined. In previous years important outbreaks of P. cockerelli have been apparently confined to the western part of the State, but during 1938 serious damage by this pest was recorded as far east as the Missouri River and probably extending into western Iowa. Efforts to control the psyllid with a 1-40 lime-sulphur spray gave highly variable results, owing, apparently, to variations in the time and manner of application. When the sprays were applied properly, satisfactory control was obtained of the psyllid and the accompanying yellows injury, particularly when power sprayers capable of maintaining a pressure ranging from 300 to 400 pounds were used. These high pressures produced a fine division of the spray and facilitated a complete coverage of the plant, which is essential for best results. The rate of application ranged from 75 to 125 gallons per acre, depending on the size of the plants. Two or three applications were necessary. The first application should be made when the plants are from 6 to 8 inches high or, preferably, shortly before the adult psyllids appear in the field. The second application should be made about 2 weeks after the first and followed, when necessary, by a third application from 10 days to 2 weeks later. Results of experimental spraying with the lime-sulphur in Colorado, in the presence of the psyllid, indicated that the potato yields may be increased as much as 200 percent by proper spraying. Varietal differences in response to psyllid yellows on potatoes have been observed but no varieties of this crop have been found which show a promising degreeof immunity or resistance to the disease.

Field toxicity tests with cryolite and paris green on hornworms infesting tobacco.--W. A. Shands and J. U. Gilmore, of the Oxford, N. C., laboratory, and Norman Allen of the Florence, S. C., laboratory, report that tests conducted during August to determine the effectiveness of dust mixtures and sprays containing synthetic cryolite and of dust mixtures containing paris green against Protoparce sexta (Johan.) and P. quinquemaculata (Haw.) infesting tobacco, demonstrated that high percentages of the hornworms were killed within a short period after the insecticides were applied when tobacco suckers infested with these hornworms were treated at the rate of 10 or more pounds per acre of a synthetic cryolite dust mixture containing 80 percent sodium aluminum fluoride, or at the rate of about 50 gallons per acre of a spray made up of 4 to 6 pounds of synthetic cryolite containing 85 percent sodium aluminum fluoride. Percentages of dead larvae ranged from 87.8 to 94.4 when the cryolite dust mixture was used and from 69.3 to 97.4 when a cryolite spray was used. Paris green and clay 1-6, when dusted on the tobacco suckers at rates of 8.3 and 13.4 pounds per acre, produced hornworm mortality of 80.4 and 94.9 percent, respectively. Judging from the data obtained in these tests, it appears that cryolite may equal, if not surpass, paris green as a hornworm insecticide when applied at the proper strength. In addition to achieving a satisfactory mortality of the hornworms, cryolite does not have some of the objectionable qualities of paris green, such as causing injury to the plants and possible injury to the operator.

Status of pea weevil as a pest in Eastern pea-growing States.--Inquiries addressed recently by this Division to entomologists in New Jersey, New York, Indiana, Illinois, Michigan, and Wisconsin, respecting the status of Bruchus pisorum (L.) as a pest in those States, have elicited the information that in New Jersey, Indiana, Illinois, and Wisconsin the insect is ordinarily present in very limited numbers and cannot be considered an important pest. In New York and in Michigan, however, the State authorities state that, although the pea weevil is no now abundant, serious damage has been caused by this pest in their States during past years when peas were grown on a commercial scale by the dried pea industry for use as seed or feed.

Tobacco moth as a pest in growers' pack houses.--During the latter part of August reports were received that Ephestia elutella (Hbn.) was causing injury to tobacco on the sticks in growers' pack houses in North Carolina. Surveys made in North Carolina and in adjacent Virginia during the second week of September by staff members of Oxford, N. C., and Richmond, Va., laboratories disclosed that this moth was present but causing little damage in the growers' pack houses in Chatham, Wilson, Lenoir, Johnston, Wake, Granville, Person, Orange, and Guilford Counties, N. C. Heavy infestations were found in Durham, Rockingham, Forsyth, and Caswell Counties, N.C., and Pittsylvania County, Va. No evidence of the presence of E. elutella adults were found in the pack houses examined in South Carolina by Norman Allen of the Florence, S. C., laboratory. While the tobacco moth is not a new pest of stored tobacco in this country or in southern Europe, this is the first time the pest has been known to cause any noticeable damage in farmers' pack houses. The survey did not bring out definitely all of the factors that might have a bearing on this unusual infestation by the tobacco moth in pack houses. However, the evidence at hand leads to the belief that the early growing season in 1938 resulted in the early curing of tobacco in the infested area, givin the moths an opportunity to develop in the early curings. These first curings were placed in the pack houses during the first week in July, approximately 1 month earlier than heretofore. A period of over a month, from early in July to late in August, would give the moths an opportunity to lay their eggs and the resulting larvae to develop to full-grown size. This is based on the fact that unde tobacco-storage-house conditions it requires from 45 to 50 days for the moth to complete a life cycle from egg to adult. The finding of the worms in the first curings of tobacco adds weight to the theory that the unusually early curing of th crop was responsible for the development of the insect in the growers' pack houses.

However, evidence is not yet at hand to state conclusively the original source of these farm infestations, that is, whether they were present on the farm in scrap tobacco or in tobacco held over from previous years, or whether the moths had migrated from infested storage houses to the farm. Apparently both of these sources of infestation may be involved. Investigations are now under way to determine the best methods of combating the tobacco moth in the pack house.

FOREIGN PARASITE INTRODUCTION

Spruce sawfly in northern Europe.--During the past season W. F. Sellers has made an extended survey of this pest and its natural enemies in northern Europe, particularly in Sweden and Finland. It was found to occur generally up to the northern limit of spruce growth. Sample collections showed about 40-percent parasitization, about two-thirds of which was by Tachinidae. This is of particular importance because it is quite rare in the collections made in past years in Czechoslovakia and adjoining countries. Extended collections of cocoons are being made in areas mentioned by representatives of the Canadian Department of Agriculture.

Study of white-fringed beetle in South America.--P. A. Berry, formerly of the forest-insects laboratory at New Haven, Conn., arrived in Argentina in September to undertake a study of the beetle and its natural enemies. Data obtained through various government agencies indicate that it is common, though not present in destructive numbers, over large parts of Argentina and Uruguay.

Corn borer parasites shipped from Italy.--In August H. D. Smith collected and shipped 8,322 adults of Phaeogenes nigridens Wesm. and 5,720 parasitized host pupae containing the same species. The two shipments reached the Moorestown, N.J., receiving station with a survival of 94.4 percent of the adults.

INSECTS AFFECTING MAN AND ANIMALS

New laboratory for study of salt-marsh mosquitoes.--A sublaboratory of the Orlando, Fla., laboratory of this Division has been established at New Smyrna, Fla., for the purpose of making more detailed studies on the biology, habits, and methods of control of salt-marsh mosquitoes. B. V. Travis, formerly engaged on the study of fire ants at Tallahassee, Fla., has been placed in charge of the new laboratory. The work on fire ants has been discontinued.

Salt-marsh mosquito control by C. C. C. camps discontinued.--On September 30 the Civilian Conservation Corps discontinued the work of its camps engaged in the control of salt-marsh mosquitoes in Delaware and New Jersey. This brought to a close over 2 years of cooperation between the Bureau of Entomology and Plant Quarantine, the Bureau of Biological Survey, and the C. C. C. on studies that dealt in part with the relationship of mosquito control and wildlife conservation. G. H. Bradley, who was in charge of this Bureau's part of the work, has returned to his former research work on mosquitoes at Orlando, Fla.

Fractions of synthetic citronella oil appear to be more repellent to mosquitoes than whole oil.--From preliminary tests by W. V. King, of the Orlando, Fla., laboratory, with various fractions of synthetic citronella oil, it is indicated that crude sesqui terpenes and crude geraniol are more repellent to mosquitoes than synthetic Ceylon type citronella oil and citronellal when these materials are applied to the bare skin to prevent mosquitoes from biting.

Pyrethrum residue not efficient as mosquito larvicide.--W. V. King, of the Orlando, Fla., laboratory, reports that tests against *Culex* larvae with a pyrethrum residue obtained from extracted pyrethrum flowers and containing from 0.1 to 0.15 percent pyrethrins indicate that this material is considerably less toxic to the larvae than are pyrethrum dusts containing an equivalent concentration of pyrethrins.

Gnats breed in enormous numbers in Clear Lake.--At Clear Lake, Calif, A. W. Lindquist estimates that at the peak of the gnat breeding season from 1½ to 50 billion adults of *Chaoborus* spp. emerge daily from the lake. This estimate was arrived at by an analysis of the numbers of gnats recovered in floating traps placed at various points on the lake. The peak of emergency occurred from August 27 to September 3. Samples of the lake bottom obtained by dredging showed from 200 to 924 larvae per square foot.

FOREIGN PLANT QUARANTINES

Mexican fruitflies for Africa.--In checking through the air express at the Brownsville airport a small cheesecloth-covered sack, apparently filled with bean pods and addressed to Tanganyika, was found. The package was not in bond and it was decided to check its contents. Thirty-six larvae of *Anastrepha distincta* Greene, 1 coleopterous larva, 3 hymenopterous adults, and 2 gelechiid larvae were found in 11 *Inga* pods from Tapachula, State of Chiapas, Mexico. Thus this country was protected against the possible escape of these potential pests and the day when East Africa might have an opportunity to accept *A. distincta* as an immigrant was indefinitely postponed.

Citrus canker notes.--The California Citrograph (vol. 23: 527 October 1938) gives the Citrus Orchardist of New Zealand as authority for the statement that some citrus trees in New Zealand had developed citrus canker and were cut back. Plantings of citrus in New Zealand are said to total only 2,500 acres, but an effort is being made to develop the industry. Being satisfied that the eradication campaign has succeeded in eliminating citrus canker from the Union of South Africa, the Governor-General issued a proclamation dated April 5, 1938, removing all restrictions on the removal and planting of citrus trees in the Union. No citrus canker has been found there since 1927. According to data accompanying a memorandum dated September 2 from the Bureau of Plant Industry, judging by tests to date, *Bacterium citri* may attack any plant of the subtribe Citrinae and also attacks *Swinglea glutinosa*, a plant doubtfully assigned to the subtribe Balsamocitrinae.

Entomological interceptions of interest.--Thirteen larvae and 1 pupa of the fruitfly *Anastrepha grandis* (Macq.) were intercepted at New Orleans on March 29 in a pumpkin in ship's stores from Brazil. Two living larvae of the Mediterranean fruitfly (*Ceratitis capitata* Wied.) were intercepted at Sumay, Guam, on February 21 in bell pepper in ship's stores on board the China Clipper from Hawaii. Two living larvae of the gypsy moth (*Porthetria dispar* L.) were taken at Seattle, Wash., on June 7 on foliage of dwarf juniper in ship's quarters from Japan. Fifty-five living specimens of the gladiolus thrips (*Taeniothrips simplex* Morison) were collected on April 6 on gladiolus plants in the field at Rio Piedras, P. R. A living larva of the pink bollworm (*Pectinophora gossypiella* Saund.) arrived at Boston on May 9 in a cottonseed in a boll in baggage from Grenada, British West Indies. Two living adults of the cerambycid *Xylotrechus rusticus* (L.) were found at Norfolk, Va., on May 28 under the bark of walnut logs in cargo from France. W. S. Fisher reports this long-horned beetle to be a European species. A living larva of the elaterid

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Athous subfuscus Muller arrived at Washington, D. C., on June 16 in soil accompanying violet plants in the mail from Ireland. Living specimens of the scale insect *Aonidiella inornata* McKenzie were intercepted at San Francisco on April 28 on betel pepper (*Piper betle*) in cargo from Hawaii. Sixteen living larvae of the weevil *Baris laticollis* Marsh. arrived at Philadelphia on April 22 in turnips in ship's stores from Portugal. A living specimen of the lygaeid *Sisamnes contractus* Dist. was taken at Brownsville, Tex., on June 10 on a pineapple in cargo from Mexico. Forty-five living larvae of the weevil *Baris lepidii* Germ. were intercepted at New York on July 5 in horseradish roots in Ship's stores from the Union of Soviet Socialist Republics.

Pathological interceptions of interest.--*Anguillulina filiformis* (Butschli) Goodey was intercepted in the roots of an *Araucaria excelsa* cutting in baggage from Germany June 3 at New York. The only previous interception of this nema was in horseradish from Germany in 1930. *Aphelenchoides* sp., probably new, was found in ginger rhizomes on September 7 at San Francisco in mail from Peru. *Diaporthe phaseolorum* (Cke. & Ell.) Sacc. was intercepted from Italy for the first time on August 30 at Galveston in string beans. An orchid plant in baggage from Guatemala intercepted at the Brownsville airport on September 24 was infected with *Hendersonia* sp., *Pestalozzia* sp., and *Phyllosticta* sp. There was so little material that specific determinations were not possible. *Heterodera marioni* (Cornu) Goodey was intercepted at San Francisco on some hosts new to our interception files, including *Astrophytum myriostigma* var. *potosina* on September 7, *A. tamanlipense*, *A. tetragona*, and *Echeveria agavoides* on August 26, *E. agavoides* and *E. potosina* on September 7, and *E. secunda* on August 26, all from Mexico. *Marssonina juglandis* Sacc. was intercepted on August 12 at New York on a *Juglans regia* leaf from Yugoslavia. *Phoma* sp. was intercepted on September 21 at Boston on a snowdrop bulb from Holland. A similar interception was made last year at Norfolk. We do not find any species of *Phoma* listed in the readily available lists as occurring on *Galanthus*, and we have not received sufficient material for study. *Puccinia* sp. II, probably *P. violae* (Schum.) DC, was intercepted at Boston on August 24 on *Viola canina* leaves in mail from Sweden. Garlic from Syria intercepted at Norfolk on September 24 bore tiny white sclerotia surrounded by violet mycelium.

Correction.--The interception of *Ramularia cynarae* credited to Philadelphia in the September News Letter p. 25 should be credited to Boston. The interception was made by Mr. Ehinger and long association of his name with Philadelphia was evidently responsible for the error.

DOMESTIC PLANT QUARANTINES

Grasshopper-control conference.--Federal and State workers on the grasshopper-control project will meet at Omaha on November 21 and 22, to discuss the outcome of the grasshopper-population survey now being carried on in the various infested States and to formulate plans for the work of the coming year in the event that funds are made available for that purpose.

Crops protected from Mormon crickets.--Loss of agricultural crops from infestations of Mormon crickets has been almost entirely prevented this year in areas in which Federal-State control operations were carried on and the cricket population has been markedly reduced in such areas. Especially satisfactory results were obtained in Moffat County, Colo., where cricket control has been an annual problem for the last 16 years. Similar results were obtained in two Utah counties. Commenting on the use of metal strips, trench barriers, and oil on canals and creeks, to supplement the dusting operations, Claude Wakeland, field project leader, states that "literally hundreds of tons of Mormon crickets have this year been destroyed by barrier traps and oil." Increased infestations were reported, however, from limited areas in Oregon, Nebraska, and the Dakotas. Control facilities have been made available to infested counties in proportion to their needs and their cooperation in the form of funds or labor. Thirty-six Federal supervisors were employed during the season and 950 Federally paid laborers at the height of activities. Volunteer laborers also contributed assistance to the project.

Mormon crickets hatching.--From Nevada report came early in September that Mormon crickets have been hatching on the east side of Calico Mountain and on the Owyhee Desert, in Humboldt County.

Rodents store Mormon cricket eggs.--The Utah State supervisor of Mormon cricket control found that the burrows of mice and of kangaroo rats contained stored eggs of the crickets. Fourteen mice and two kangaroo rats were caught feeding on such eggs.

Formula for Mormon cricket poison checked.--Upon receiving complaints from a Wyoming rancher that the mixture of 3 parts of diatomaceous earth to 1 part sodium arsenite as a Mormon cricket poison was not giving a satisfactory kill, the assistant field project leader made check tests at Sheridan, Wyo., with the result that the 3 to 1 mixture gave a satisfactory kill, although the more expensive 2 to 1 mixture killed crickets more promptly. The poor results obtained at the Wyoming ranch from which complaint came were found to be due to the fact that dusting had been done on rainy days.

White-fringed beetle inspection and control.--Recent activities include the inspection of highways and railroads leading out of known infested areas, of the outside barrier ditch around the Florala area, of 20 infested blocks at Goulding, near Pensacola, Fla., where but 4 beetles were found, and the inspection of New Orleans and outlying districts including the town of Diamond, 40 miles south, where an infestation was found. Inspection was also made of the entire 41 nurseries in Harrison County, Miss., 18 of which are in the quarantined area. Many of these nurseries have been inspected from five to seven times. A minor infestation was confirmed in September on a 6-acre tract in the vicinity of rice fields in Jefferson Davis Parish, La. The most westerly known infestation is now separated by only one county from Texas and the most easterly by only one county from Georgia. Control operations have consisted of dusting infested cotton fields at Florala, spraying around gins, warehouses, and school yards in the above area, on properties recently found infested at Laurel, Miss., and on heavily infested areas at Gulfport, Miss. The clean-up activities in Alabama and Florida are carried on with State-sponsored W. P. A. labor. One of the most complete jobs of weed killing and oil spraying that has been done on the project was that recently accomplished at Mobile, Ala. The infestation in this area, located in the railroad yards and vicinity, is light and the intense spraying, together with brush cleaning with a corps of 200 W. P. A. laborers, has placed a wide protective zone around this infestation. Several nursery inspectors have covered the Mobile nurseries twice without finding any white-fringed beetles.

Sweetpotato weevil infestations reduced.--Substantial progress is being made in sweetpotato weevil control, as indicated by a comparison of conditions of the current season with those of 1937, when the project was initiated on a Federal-State basis. A reduction of weevil infestations has been effected in areas worked in Texas, Louisiana, Alabama, Mississippi, and Georgia. A 75-percent reduction is indicated in areas in Mississippi, and a 63-percent reduction in an Alabama district. In a recent intensive survey of seven Texas counties formerly infested, only two infestations were found. Inspections in 10 Georgia counties in September resulted in finding no new infestations. Scouting has been recently extended with the assistance of State inspectors to additional counties in the infested States. In September inspections were made in 23 counties of 4 infested States, 14 Federal and 14 State inspectors participating. As a result of public hearings by Commissioners' Courts of two Texas counties found to be infested in the current season, a request was made to have the counties brought within the regulated area and the project leader has accordingly extended the eradication work to include these counties. Another Mississippi county has also been added to the eradication area. State agencies have displayed specimens of weevil injury at local fairs in the respective counties where eradication work is under way.

Phony peach disease reduced.--Six States in which the phony peach disease has occurred in previous seasons yielded no cases of such infection in the current field season. These States are Illinois, Indiana, Kentucky, Maryland, Oklahoma, and Pennsylvania. Neither was phony peach disease found in the 1-mile radius of nurseries in Missouri, North Carolina, and South Carolina. Findings of phony trees in Missouri were reduced from 219 in 1936 to 2 in 1938; in North Carolina from 161 to 14; in South Carolina from 479 to 43; and in the commercial Nashville-Highland area of southwestern Arkansas, from 90 to 19. Reductions were effected in practically all other Arkansas counties except one. It is felt that one of the objectives of the last 3 years, that of controlling the phony peach disease in the outer rim of the infected region, with special reference to nursery districts and lightly infected States, is being accomplished. The States have contributed largely in funds, services, and regulatory action. Results of inspection in the more generally infected States are not yet available.

Peach mosaic inspections.--Inspection for the peach mosaic disease jointly with affected States, was completed or approaching completion in the various infected States by October 1. From growers of large orchards in Arizona and California an increased number of requests have come for inspection of their peach orchards and removal of diseased trees. Recent work in Texas has been devoted to nursery stock and bud-wood sources, the inspectors finding that a number of additional nurseries in that State are growing quantities of peach stock. Nursery inspection was also conducted in two Utah counties. A third survey for 1938 of orchards and reinspection of nursery stock in Mesa County, Colo., revealed 29 mosaic trees, as compared with 116 in the third survey in 1937. Diseased and abandoned trees are being removed in Arizona, California, Colorado, New Mexico, and Utah, with the aid of funds from Federal relief appropriations, and in Texas by State-paid labor.

Transit-inspection activities.--No live beetles were found in the September inspection of cars of produce arriving at Midwest points from the Japanese beetle area. With the seasonal lifting of Japanese beetle restrictions on fruit and vegetable shipments on September 19, inspection of such shipments at Midwest points was suspended and attention was turned to the seasonal shipment of nursery stock.

According to observations of the inspector as to shipments seen at St. Paul, Iowa leads in shipment of perennials and Pennsylvania of bulbs. From inspectors in Chicago, St. Louis, Atlanta, and Philadelphia, came reports of the interception during the summer of a total of 33 shipments of uncertified gladioli from a single shipper in the Japanese beetle area in New York State, and New York inspectors report the interception of a like number of shipments of perennial roots from a Long Island point. Packages of the home type, such as cut flowers and farm produce, constitute a source of concern in the inspection work of the late summer. Two inspectors from Bermuda visited the inspection stations at New York and Philadelphia in August. An Illinois State inspector is assisting in the work at Chicago. A new, modern building has just been completed for the Railway Mail Service terminal at Council Bluffs.

Good method effected in killing citrus seedlings.--One of the problems in citrus canker eradication is the recurrence of the disease through the growth of citrus seed in localities from which all visible citrus plants have been eradicated. Sterilizing the ground with the use of a pear burner after such tree removal, a method which has been employed since the early part of the year, is giving satisfactory results. On a recent third working of old infected areas by this method, no citrus seedlings could be found.

Citrus canker inspection and eradication.--Inspection was conducted in five Texas counties in August and six in September, with the inspection force increased to five State and five Bureau men. Orange and grapefruit groves and dooryard trees in farm areas were inspected, as well as previously worked properties. Canker was found on small Citrus trifoliata trees on two properties in the vicinity of Alvin. On one of the properties not previously found infected, the disease was found on stumps of little trees in a pasture that had been cut each year with a mowing machine. The plan of inspecting all pastures and prairies with crews of laborers is being continued with splendid success. Most of these men have been on the project for some time and have developed a keen eye for small trees in weeds and grass.

Gypsy moth quarantine revised.--The gypsy moth and brown-tail moth quarantine and regulations were revised effective September 29, the principal change consisting of the release of certain areas from regulation and change in designation of certain other areas from that of lightly infested to generally infested.

CONTROL INVESTIGATIONS

Compiled insecticide report issued.--This Division has issued in mimeograph form a report compiled by E. R. McGovran, of the Beltsville, Md., laboratory, covering some of the insecticide tests made by E. H. Siegler, J. P. Vinzant, N. F. Howard, R. A. Fulton, Roy E. Campbell, L. B. Scott, M. C. Swingle, J. B. Gahn, A. M. Phillips, W. N. Sullivan, and G. L. Phillips. The report brings together the data from tests on various insects, and in some instances also from plant-injury tests, of new materials that have been tested by workers in the Division of Control Investigations or reported to this Division by other divisions in the Bureau. Report No. 1 covers the last quarter in 1937. All results on a single material that are on file in this Division are grouped together. Results of plant-injury tests are included, along with insect tests where this information is on hand. The materials are divided into three groups. The first group gives results with well-known insecticides which may be used as a basis for evaluating results obtained with new materials applied to the same test insects. In the second group are the new materials that have been tested on both insects and plants, and in the third group new materials that had been tested only on insects. Within each group, for the convenience of those who are primarily interested in the most toxic materials tested, the materials are arranged in the order of descending toxicity, that is, the materials that caused the highest mortalities of the test insects are placed first. The report covers 47 mimeographed pages and data on 87 materials are given. Five hundred tests on toxicity to insects and 82 tests on plants to determine whether growing plants would tolerate being sprayed with some of the materials that appeared toxic to insects are included. Twelve species of insects and three species of plants had been used in the tests.

The southern armyworm a typical lepidopteran.--The question as to how typical a lepidopteran is *Prodenia eridania* Cram. has been answered in part by P. A. Woke, Beltsville, who has investigated the histology of the alimentary canal of the mature larva, in conjunction with a study of the effects of insecticides on the gut epithelium. The intestinal canal is a straight tube, separable into the usual primary divisions of fore-, mid-, and hind-guts. An unusual structure is found in the pharynx. The mid-gut epithelium is columnar and appears to consist of two chief cell types, the typical columnar cell and the goblet or calyciform cell, with transitional forms between these. The histology of this larval alimentary tract, therefore, is typically lepidopteran.

INSECTICIDE INVESTIGATIONS

New adhesive for insecticides patented.--One of the drawbacks to derris, phenothiazine, and other insecticides is a lack of adhesiveness. As a result, when they are sprayed or dusted on plant foliage, they do not remain on the foliage as does lead arsenate but are easily washed off by even a light rain. In order to overcome this disadvantage L. D. Goodhue, of the Division of Insecticide Investigations, studied a number of materials with especial reference to their use as stickers for derris. One of the best materials is a rosin residue, a substance which remains in the fractionating column after the removal of solvent and pine oil in the steam and solvent process for the production of naval stores from pine wood. U. S. patent 2,129,517, which covers this product, was granted to Mr. Goodhue on September 6, 1938.

Patents on rotenone.--Abstracts of foreign and domestic patents relating to derris, lonchocarpus, tephrosia, and rotenone have been compiled by R. C. Roark and published as mimeographed publication E-446. Eleven countries have issued 110 patents relating to rotenone products.

Preparation of amyl salicylates.--The salicylates of the eight amyl alcohols are of entomological interest because certain of them are attractive to the tobacco hornworm moth. A chemical study of three of these salicylates is reported by A. F. Freeman and H. L. Haller in the Journal of the American Chemical Society (vol. 60, no. 9, pp. 2274-2275. September 1938).

Removal of nicotine-bentonite spray residues from apples at harvest.--Jack E. Fahey and H. W. Rusk, of this Division, and L. F. Steiner and R. F. Sazama, of the Division of Fruit Insect Investigations, have recently reported that nicotine bentonite spray residues on apples may be easily removed by either hydrochloric acid or sodium silicate (Hoosier Hort., vol. 20, no. 9, pp. 138-141. September 1938). The alkaline wash is more effective.

BEE CULTURE

Green acorns produce extra-floral nectar gathered by bees.--C. E. Burnside reports that during August honeybees in large numbers worked actively at green acorns of jack or barren oak (*Quercus marilandica*) near the Bureau's experimental apiary at Beltsville, Md. Bees were observed searching the cups and reaching beneath the cup scales or between the cups and acorns with their tongues, as if sucking up nectar. On examination of the green acorns small droplets of a liquid with a sweetish taste were found beneath the cup scales and on the inside surface of the cup. As no insects that would account for a secretion of this nature were seen on the acorns, the droplets probably were extra-floral nectar.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Rearing of two supposedly rare Curculionidae.--Two species of the curculionid genus *Barinus*, namely, *B. squamolineatus* Casey and *B. curticollis* Casey, have been reared in the Division by W. H. Anderson from larvae occurring in the lower parts of stems of the sedge *Cyperus strigosus* taken in the immediate vicinity of Washington, D. C. The adults represent the only individuals of these species in the National Museum collections from this area, while larvae of neither species were previously known.

Tobacco flea beetle.--A copious and well-preserved alcoholic sample supposed to be *Epitrix parvula* (F.), and studied by H. S. Barber, raises questions of identity and variation, suggesting that our knowledge of this pest is not so complete as it should be. The sample, which consisted of several lots from diverse solanaceous host plants in and near Quincy, Fla., collected by F. S. Chamberlin, of the Division of Truck Crop and Garden Insect Investigations, seems to consist of two forms, one of which is indigenous, while the other seems identical with a West Indian species. The slight differences in markings, sculpture, and shape appeared to be variational but, in those dissected, seem correlated with differences in male genitalia which indicate specific distinctness. This suggests that a tropical species has been introduced and may be spreading unnoticed in the Southern States among the common form of tobacco flea beetle. Still another pale yellow relative of this species is known to live upon the "potato tree"(*Solanum* verbascifolium), a common roadside shrub of southern Florida, but of this nothing seems to be known except a few individual specimens in collections. Several other species of *Epitrix* native to wild solanaceous plants have become pests and a better knowledge of the species living on *Physalis*, *Datura*, and native *Solanum*, or wild tobacco, in the South and Southwest should be assembled through observations and alcoholic samples. It is hoped that such preserved material, accompanied by full observation data, may be submitted to the Division of Insect Identification by entomologists of the Bureau who are stationed in the field.

Ants injuring coffee in Costa Rica.--Specimens of ants were recently received from R. Mangel Nanne, of the Costa Rica Department of Agriculture, with the report that the species was causing very serious injury to coffee trees by burrowing in the twigs. They were identified by M. R. Smith as *Myrmelachista* (*Decamera*) *zeledoni* Emery, a species closely related to *M.* (*D.*) *remulorum* Wheeler, known commonly as the "hormiguilla," which causes similar injury to coffee in Puerto Rico.

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